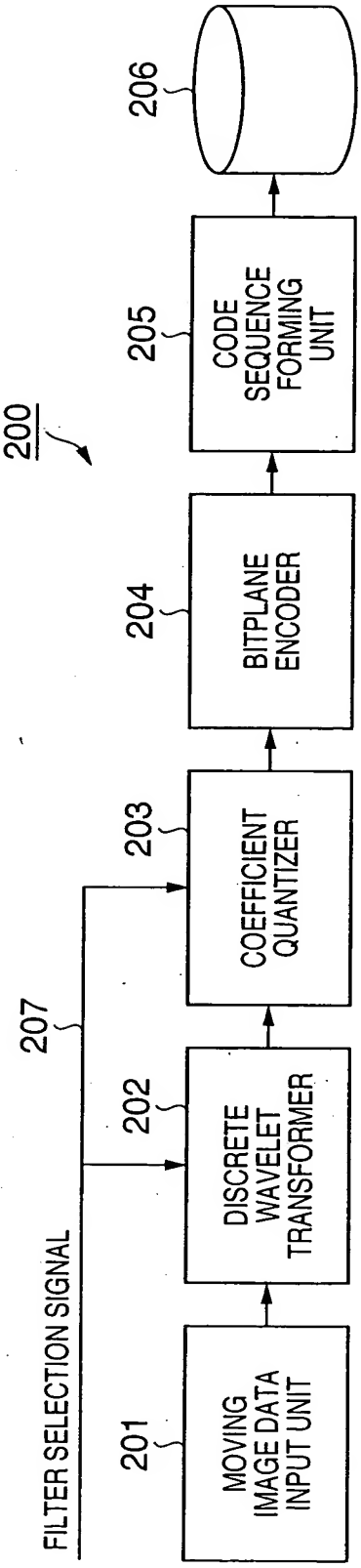
FIG. 1


200
201
MOVING IMAGE DATA INPUT UNIT
202
DISCRETE WAVELET TRANSFORMER
203
COEFFICIENT QUANTIZER
204
BITPLANE ENCODER
205
CODE SEQUENCE FORMING UNIT
206
207
FILTER SELECTION SIGNAL

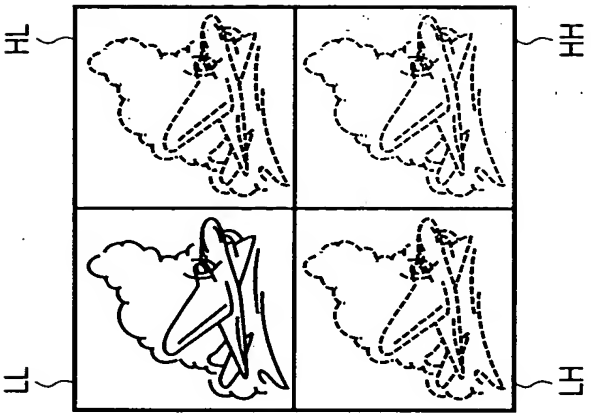


FIG. 2C

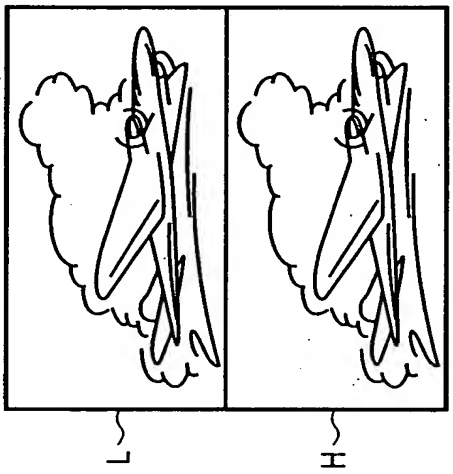


FIG. 2B

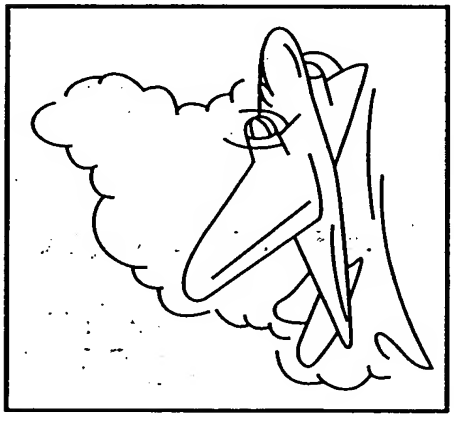


FIG. 2A

FIG. 3

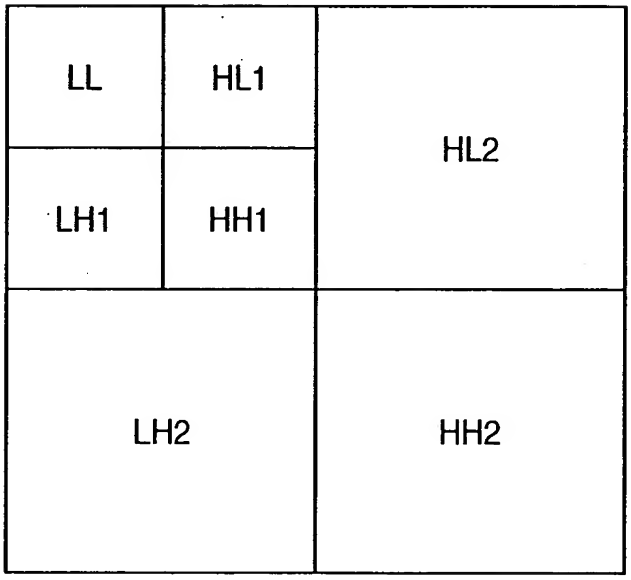


FIG. 4

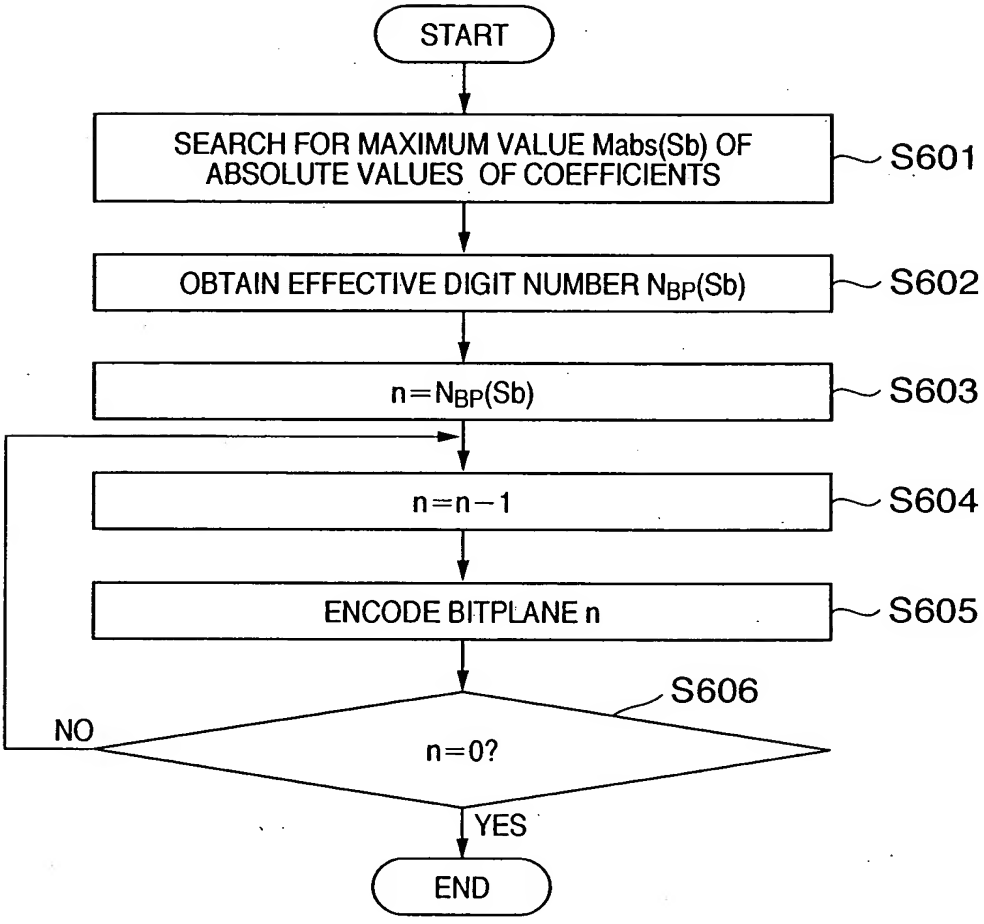

START
SEARCH FOR MAXIMUM VALUE Mabs(Sb) OF ABSOLUTE VALUES OF COEFFICIENTS
S601
OBTAIN EFFECTIVE DIGIT NUMBER $N_{BP}(Sb)$
S602
$n=N_{BP}(Sb)$
S603
n=n−1
S604
ENCODE BITPLANE n
S605
S606
n=0?
NO
YES
END

FIG. 5

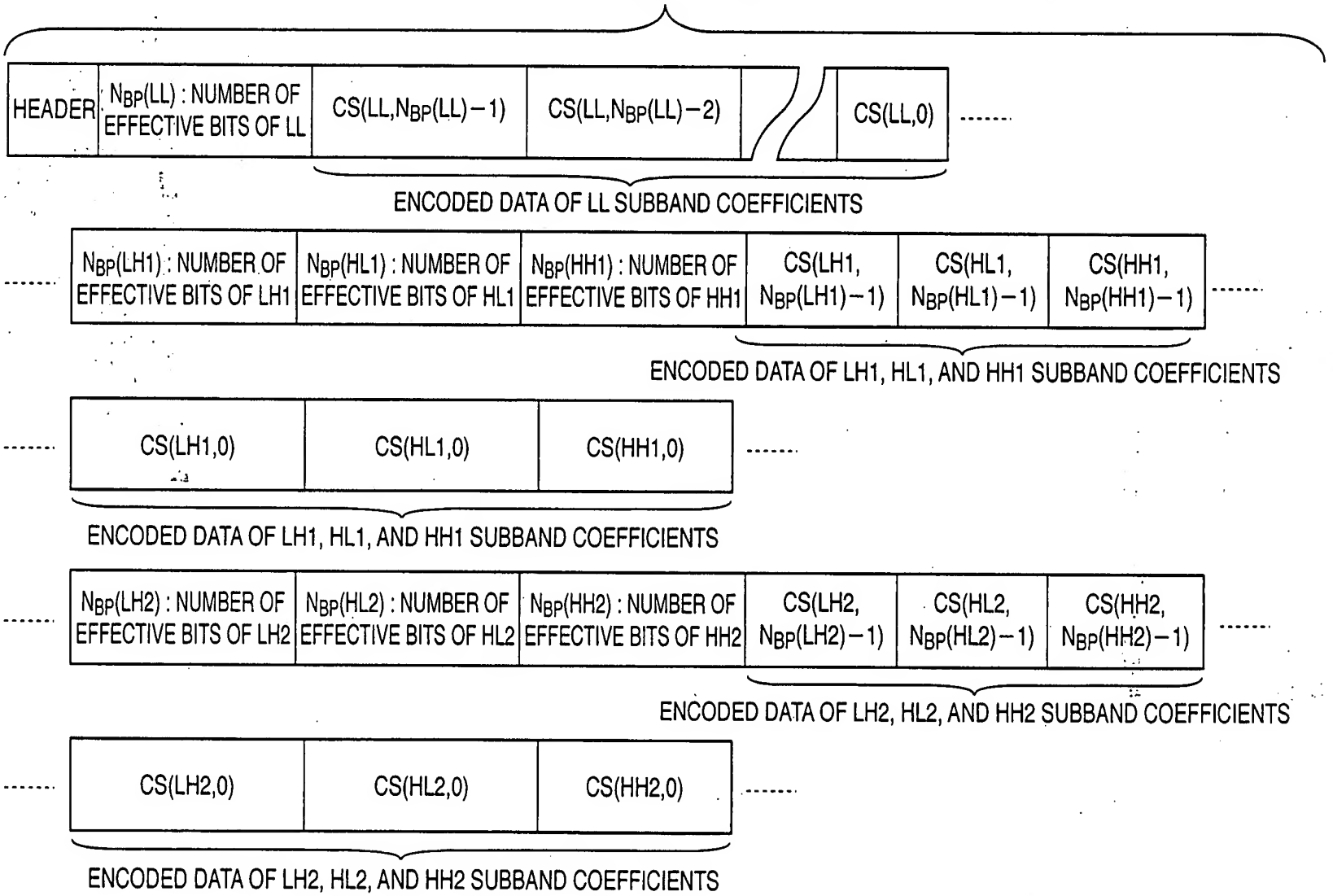

HEADER
N_{BP}(LL) : NUMBER OF EFFECTIVE BITS OF LL
CS(LL,N_{BP}(LL)−1)
CS(LL,N_{BP}(LL)−2)
CS(LL,0)
ENCODED DATA OF LL SUBBAND COEFFICIENTS
N_{BP}(LH1) : NUMBER OF EFFECTIVE BITS OF LH1
N_{BP}(HL1) : NUMBER OF EFFECTIVE BITS OF HL1
N_{BP}(HH1) : NUMBER OF EFFECTIVE BITS OF HH1
CS(LH1, N_{BP}(LH1)−1)
CS(HL1, N_{BP}(HL1)−1)
CS(HH1, N_{BP}(HH1)−1)
ENCODED DATA OF LH1, HL1, AND HH1 SUBBAND COEFFICIENTS
CS(LH1,0)
CS(HL1,0)
CS(HH1,0)
ENCODED DATA OF LH1, HL1, AND HH1 SUBBAND COEFFICIENTS
N_{BP}(LH2) : NUMBER OF EFFECTIVE BITS OF LH2
N_{BP}(HL2) : NUMBER OF EFFECTIVE BITS OF HL2
N_{BP}(HH2) : NUMBER OF EFFECTIVE BITS OF HH2
CS(LH2, N_{BP}(LH2)−1)
CS(HL2, N_{BP}(HL2)−1)
CS(HH2, N_{BP}(HH2)−1)
ENCODED DATA OF LH2, HL2, AND HH2 SUBBAND COEFFICIENTS
CS(LH2,0)
CS(HL2,0)
CS(HH2,0)
ENCODED DATA OF LH2, HL2, AND HH2 SUBBAND COEFFICIENTS

FIG. 6

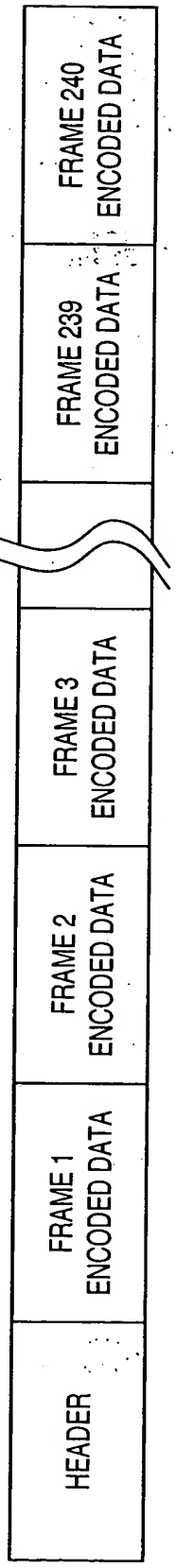

HEADER
FRAME 1 ENCODED DATA
FRAME 2 ENCODED DATA
FRAME 3 ENCODED DATA
FRAME 239 ENCODED DATA
FRAME 240 ENCODED DATA

FIG. 7

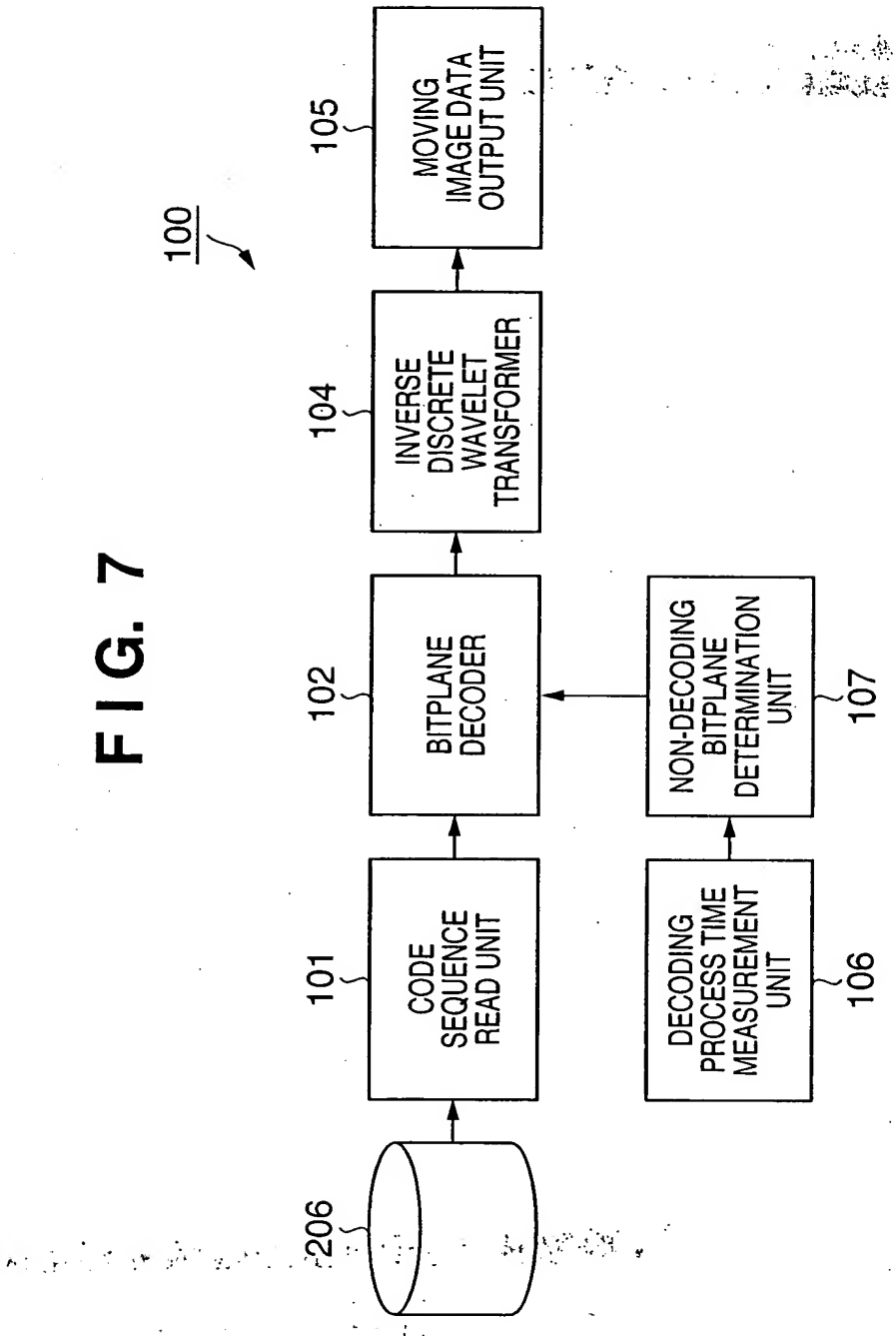

100
105
MOVING IMAGE DATA OUTPUT UNIT
104
INVERSE DISCRETE WAVELET TRANSFORMER
102
BITPLANE DECODER
107
NON-DECODING BITPLANE DETERMINATION UNIT
101
CODE SEQUENCE READ UNIT
106
DECODING PROCESS TIME MEASUREMENT UNIT
206

FIG. 8

SUBBAND / Q FACTOR	0	1	2	3	4	5	6	7	8	9
HH2	0	1	2	3	4	5	5	6	6	6
HL2(LH2)	0	1	2	3	4	5	5	6	6	6
HH1	0	1	2	3	4	5	5	6	6	6
HL(LH1)	0	0	1	2	3	3	4	4	5	5
LL	0	0	0	0	1	1	2	2	2	3

FIG. 9

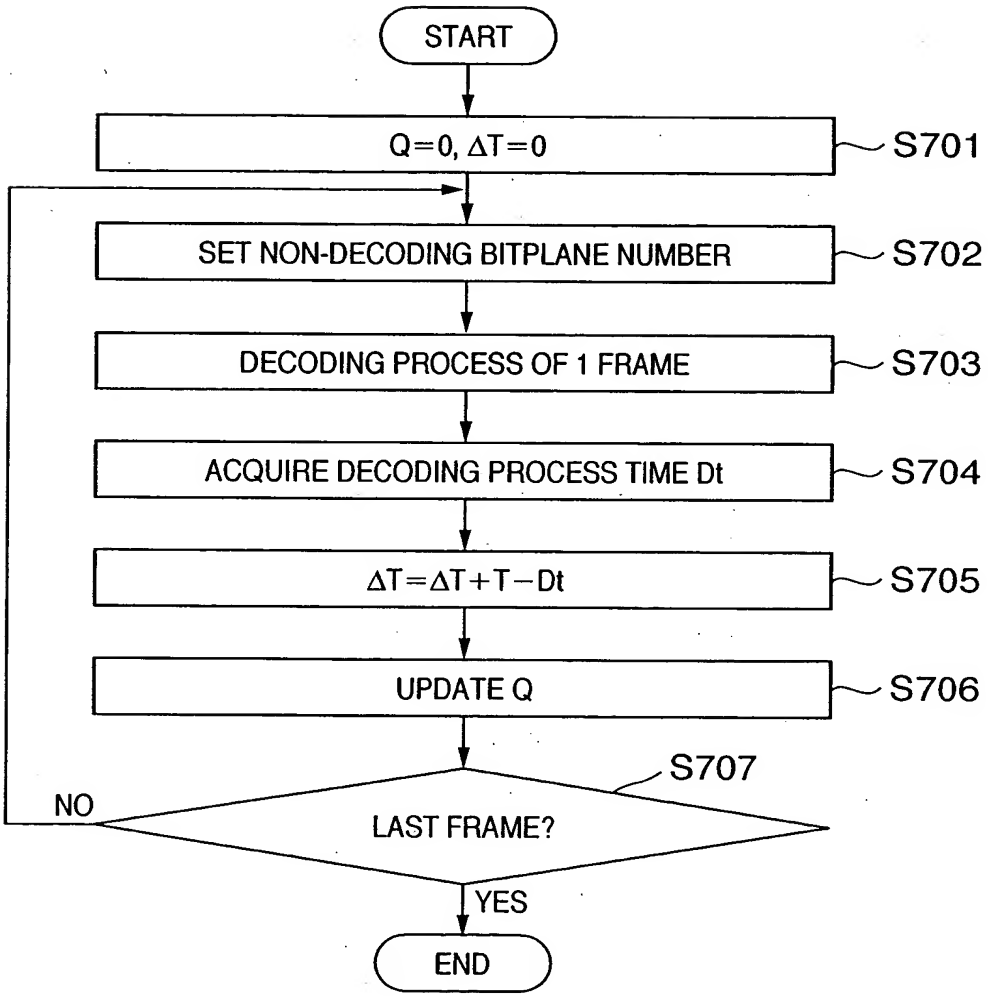

START
Q=0, ΔT=0
S701
SET NON-DECODING BITPLANE NUMBER
S702
DECODING PROCESS OF 1 FRAME
S703
ACQUIRE DECODING PROCESS TIME Dt
S704
ΔT=ΔT+T−Dt
S705
UPDATE Q
S706
S707
NO
LAST FRAME?
YES
END

FIG. 10

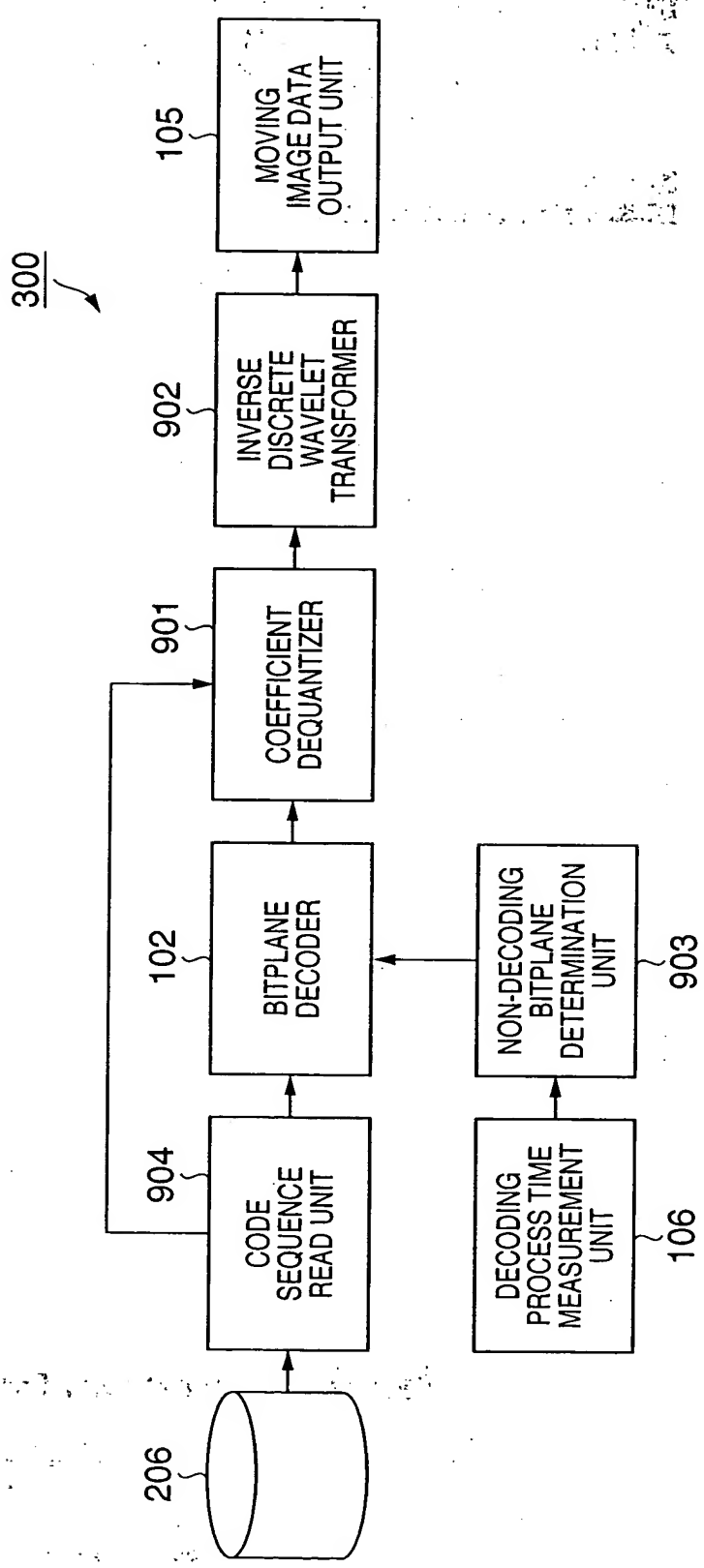

300
105
MOVING IMAGE DATA OUTPUT UNIT
902
INVERSE DISCRETE WAVELET TRANSFORMER
901
COEFFICIENT DEQUANTIZER
102
BITPLANE DECODER
903
NON-DECODING BITPLANE DETERMINATION UNIT
904
CODE SEQUENCE READ UNIT
106
DECODING PROCESS TIME MEASUREMENT UNIT
206

FIG. 11

SUBBAND Sb	NON-DECODING BITPLANE NUMBER ND(Sb)
HH2	1
LH2	1
HL2	1
HH1	1
LH1	0
HL1	0
LL	0

FIG. 12

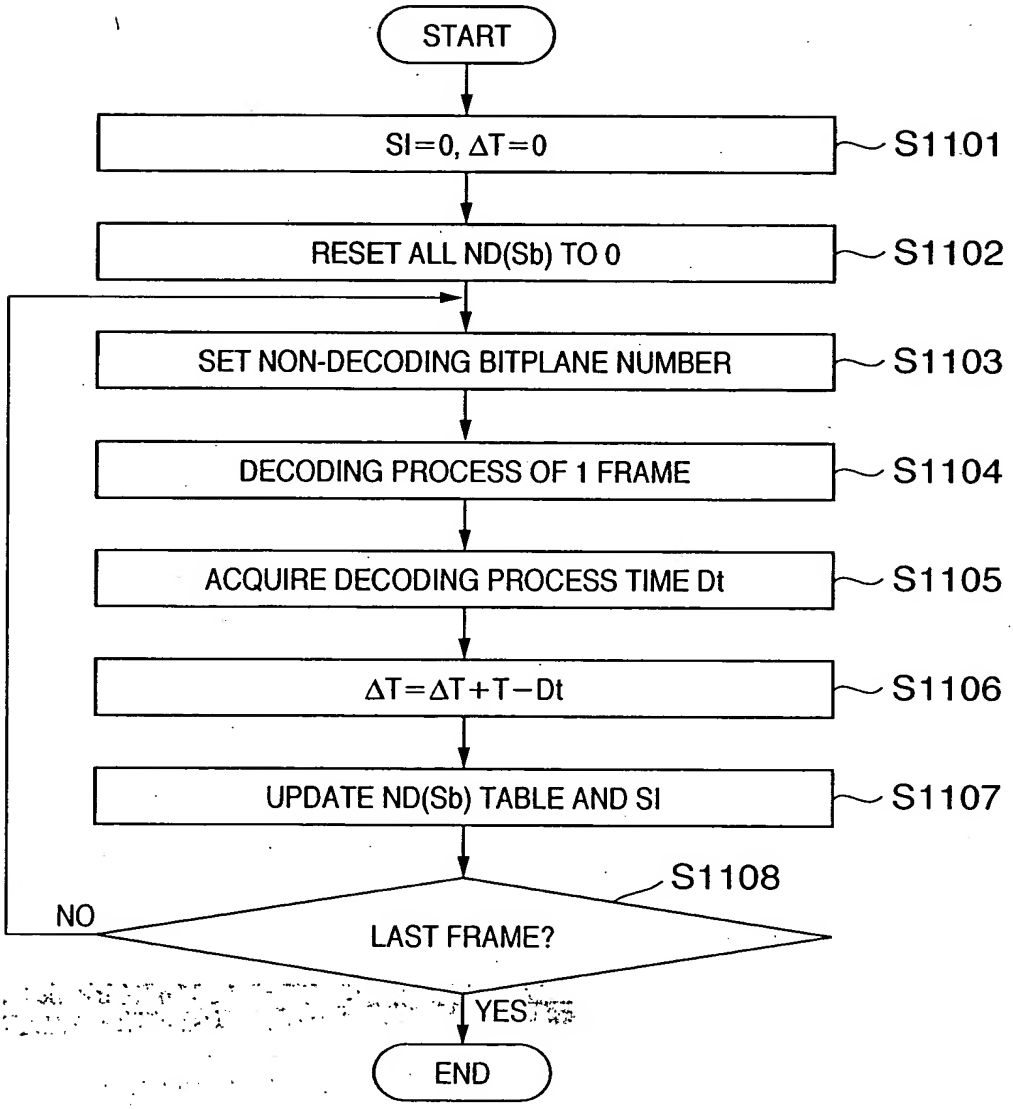

START
SI=0, ΔT=0
S1101
RESET ALL ND(Sb) TO 0
S1102
SET NON-DECODING BITPLANE NUMBER
S1103
DECODING PROCESS OF 1 FRAME
S1104
ACQUIRE DECODING PROCESS TIME Dt
S1105
ΔT=ΔT+T−Dt
S1106
UPDATE ND(Sb) TABLE AND SI
S1107
S1108
LAST FRAME?
NO
YES
END

FIG. 13

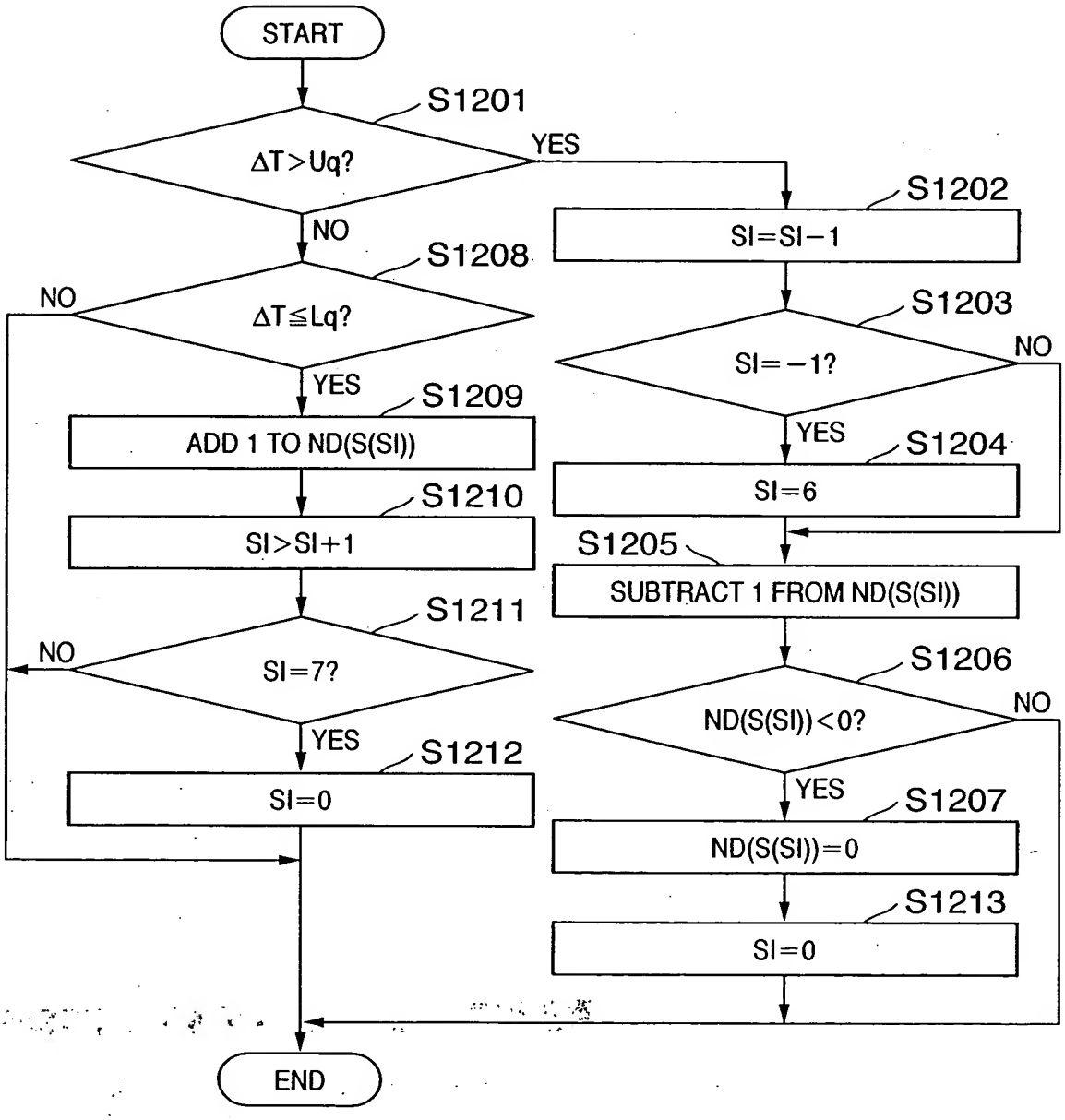

START
S1201
ΔT>Uq?
YES
NO
S1208
ΔT≦Lq?
NO
YES
S1209
ADD 1 TO ND(S(SI))
S1210
SI>SI+1
S1211
SI=7?
NO
YES
S1212
SI=0
S1202
SI=SI−1
S1203
SI=−1?
NO
YES
S1204
SI=6
S1205
SUBTRACT 1 FROM ND(S(SI))
S1206
ND(S(SI))<0?
NO
YES
S1207
ND(S(SI))=0
S1213
SI=0
END

FIG. 14

SUBBAND INDEX SI	SUBBAND Sb
0	HH2
1	LH2
2	HL2
3	HH1
4	LH1
5	HL1
6	LL

FIG. 15

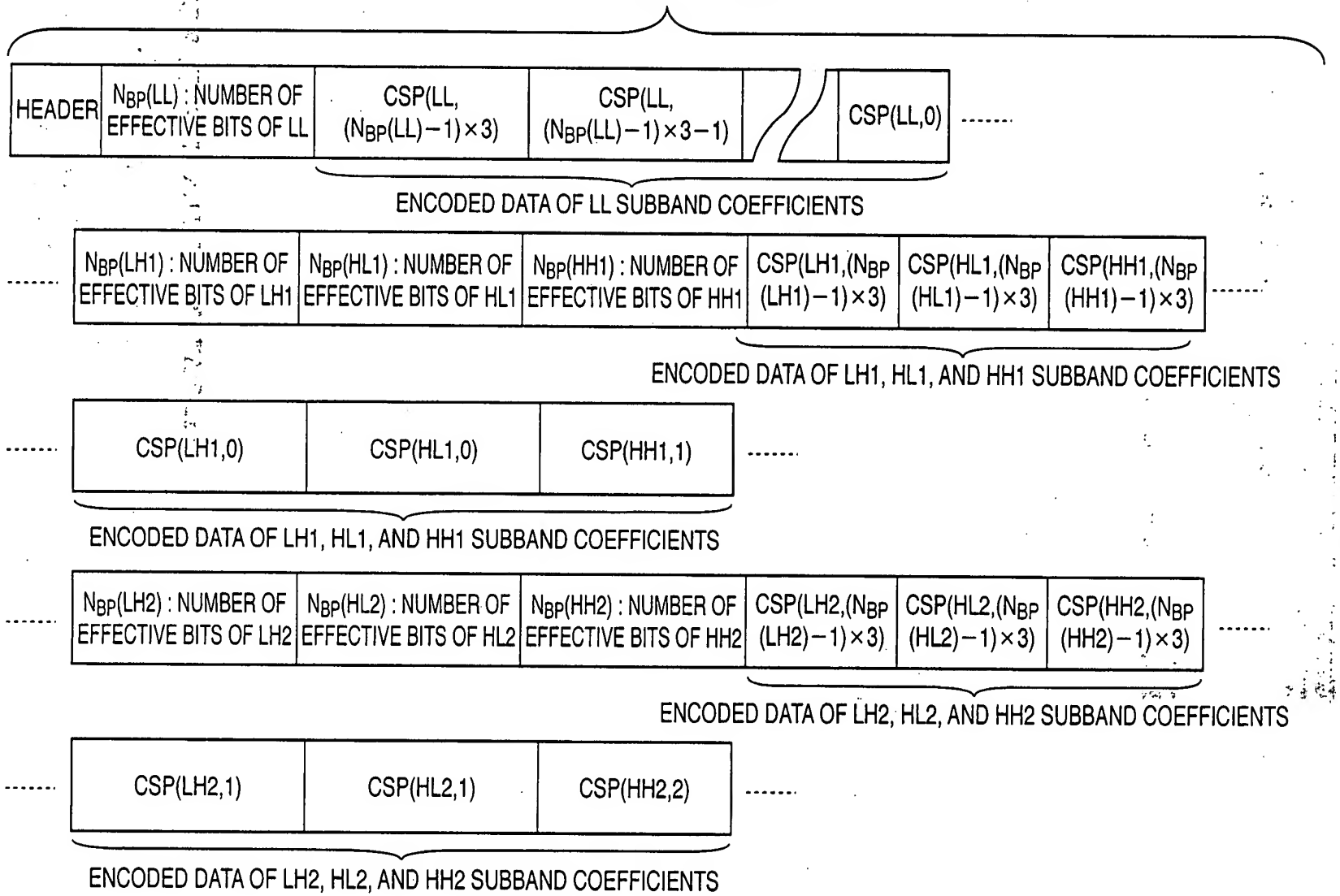

HEADER
N_{BP}(LL) : NUMBER OF EFFECTIVE BITS OF LL
CSP(LL, (N_{BP}(LL)−1)×3)
CSP(LL, (N_{BP}(LL)−1)×3−1)
CSP(LL,0)
ENCODED DATA OF LL SUBBAND COEFFICIENTS
N_{BP}(LH1) : NUMBER OF EFFECTIVE BITS OF LH1
N_{BP}(HL1) : NUMBER OF EFFECTIVE BITS OF HL1
N_{BP}(HH1) : NUMBER OF EFFECTIVE BITS OF HH1
CSP(LH1,(N_{BP}(LH1)−1)×3)
CSP(HL1,(N_{BP}(HL1)−1)×3)
CSP(HH1,(N_{BP}(HH1)−1)×3)
ENCODED DATA OF LH1, HL1, AND HH1 SUBBAND COEFFICIENTS
CSP(LH1,0)
CSP(HL1,0)
CSP(HH1,1)
ENCODED DATA OF LH1, HL1, AND HH1 SUBBAND COEFFICIENTS
N_{BP}(LH2) : NUMBER OF EFFECTIVE BITS OF LH2
N_{BP}(HL2) : NUMBER OF EFFECTIVE BITS OF HL2
N_{BP}(HH2) : NUMBER OF EFFECTIVE BITS OF HH2
CSP(LH2,(N_{BP}(LH2)−1)×3)
CSP(HL2,(N_{BP}(HL2)−1)×3)
CSP(HH2,(N_{BP}(HH2)−1)×3)
ENCODED DATA OF LH2, HL2, AND HH2 SUBBAND COEFFICIENTS
CSP(LH2,1)
CSP(HL2,1)
CSP(HH2,2)
ENCODED DATA OF LH2, HL2, AND HH2 SUBBAND COEFFICIENTS

FIG. 16

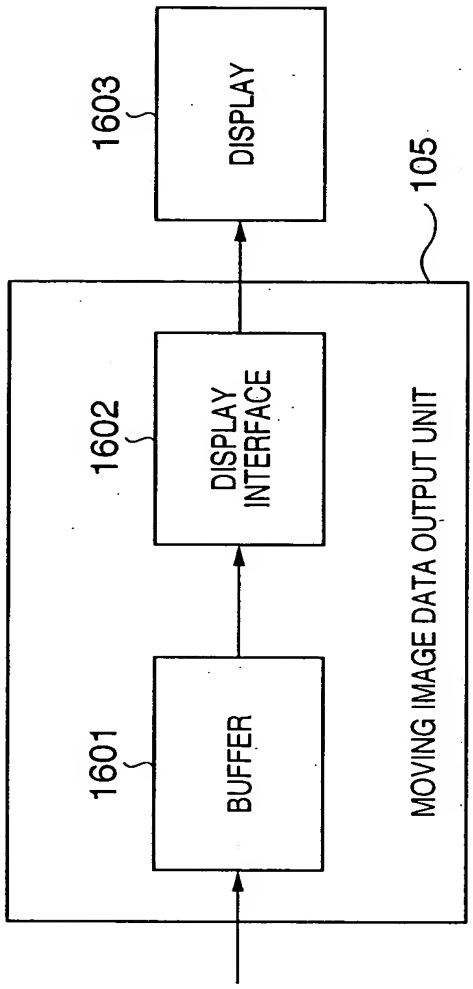

1603
DISPLAY
105
1602
DISPLAY INTERFACE
MOVING IMAGE DATA OUTPUT UNIT
1601
BUFFER

FIG. 17

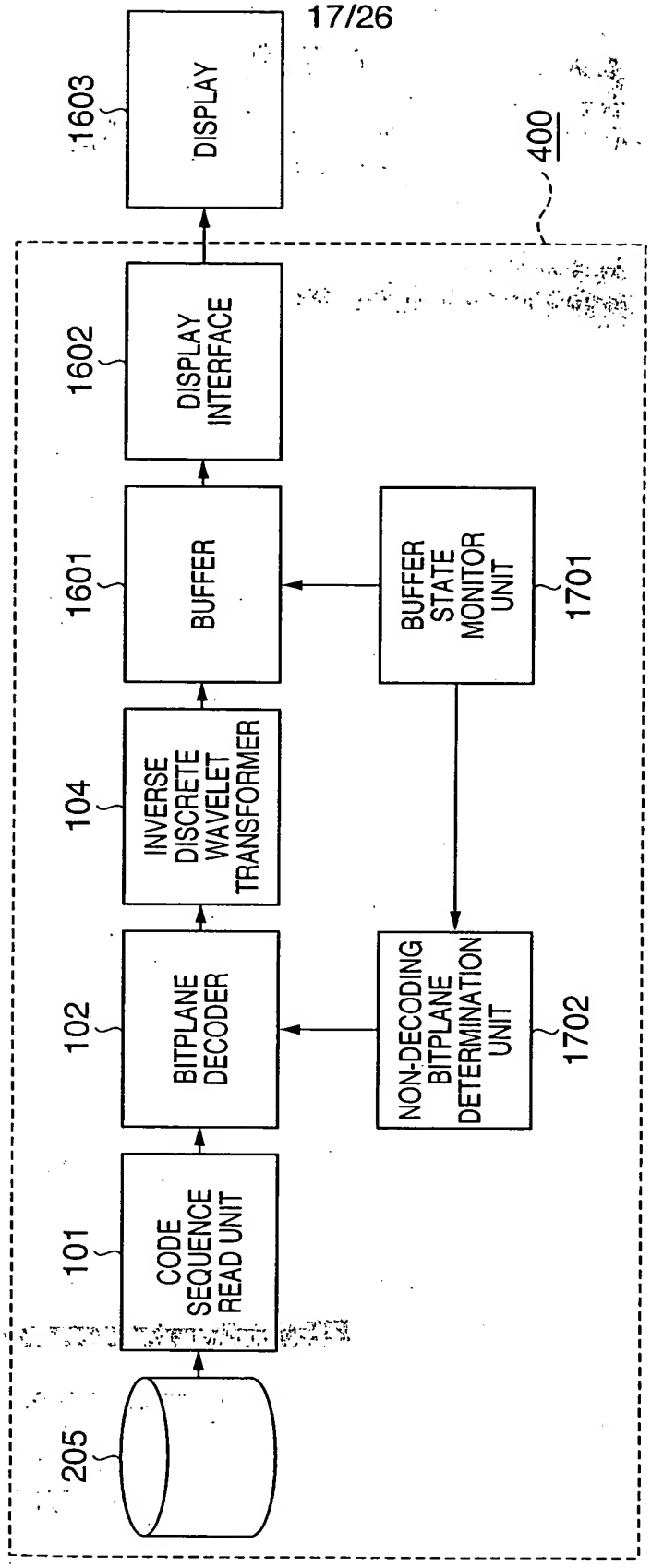

205
CODE SEQUENCE READ UNIT
101
BITPLANE DECODER
102
INVERSE DISCRETE WAVELET TRANSFORMER
104
BUFFER
1601
DISPLAY INTERFACE
1602
DISPLAY
1603
400
NON-DECODING BITPLANE DETERMINATION UNIT
1702
BUFFER STATE MONITOR UNIT
1701

FIG. 18

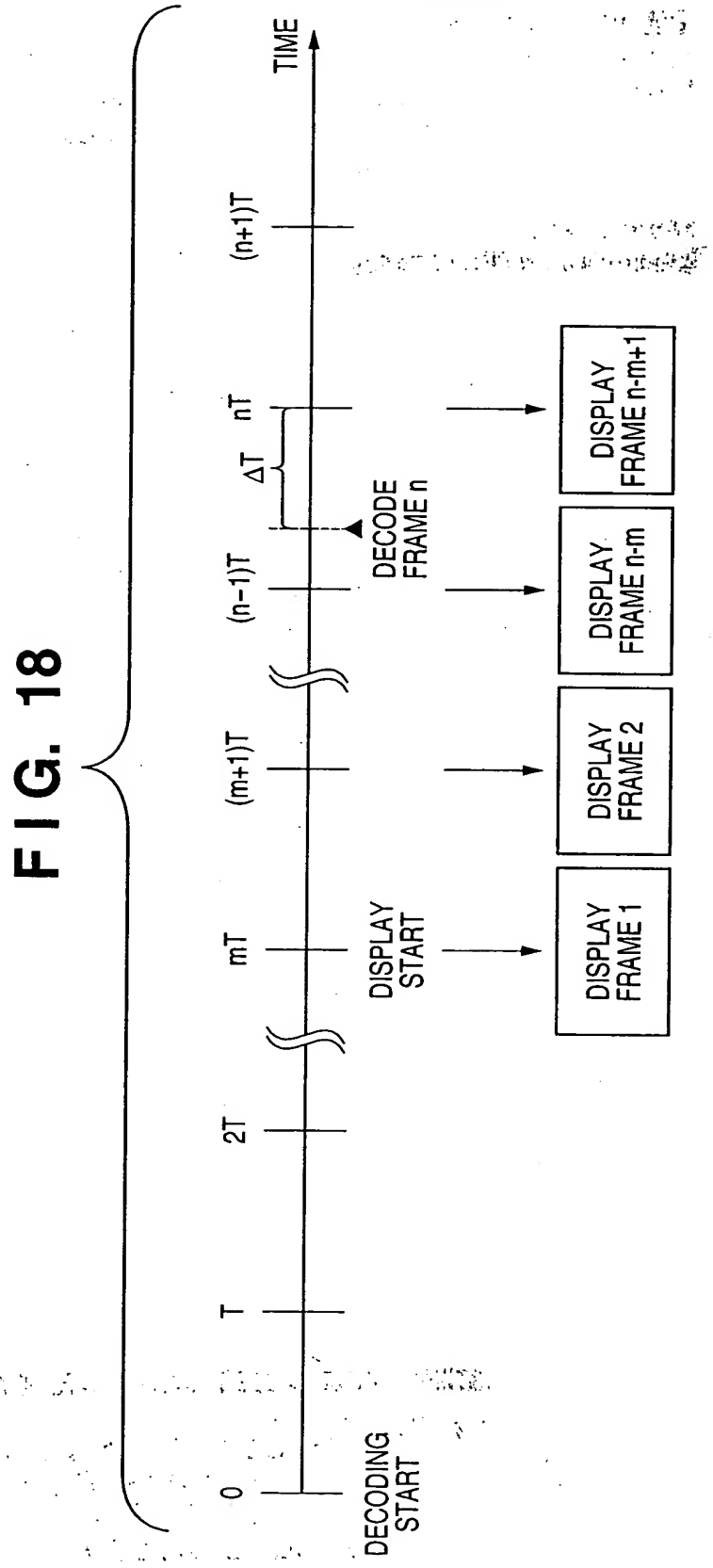

TIME
(n+1)T
nT
ΔT
(n-1)T
(m+1)T
mT
2T
T
0
DECODING START
DISPLAY START
DECODE FRAME n
DISPLAY FRAME 1
DISPLAY FRAME 2
DISPLAY FRAME n-m
DISPLAY FRAME n-m+1

FIG. 19

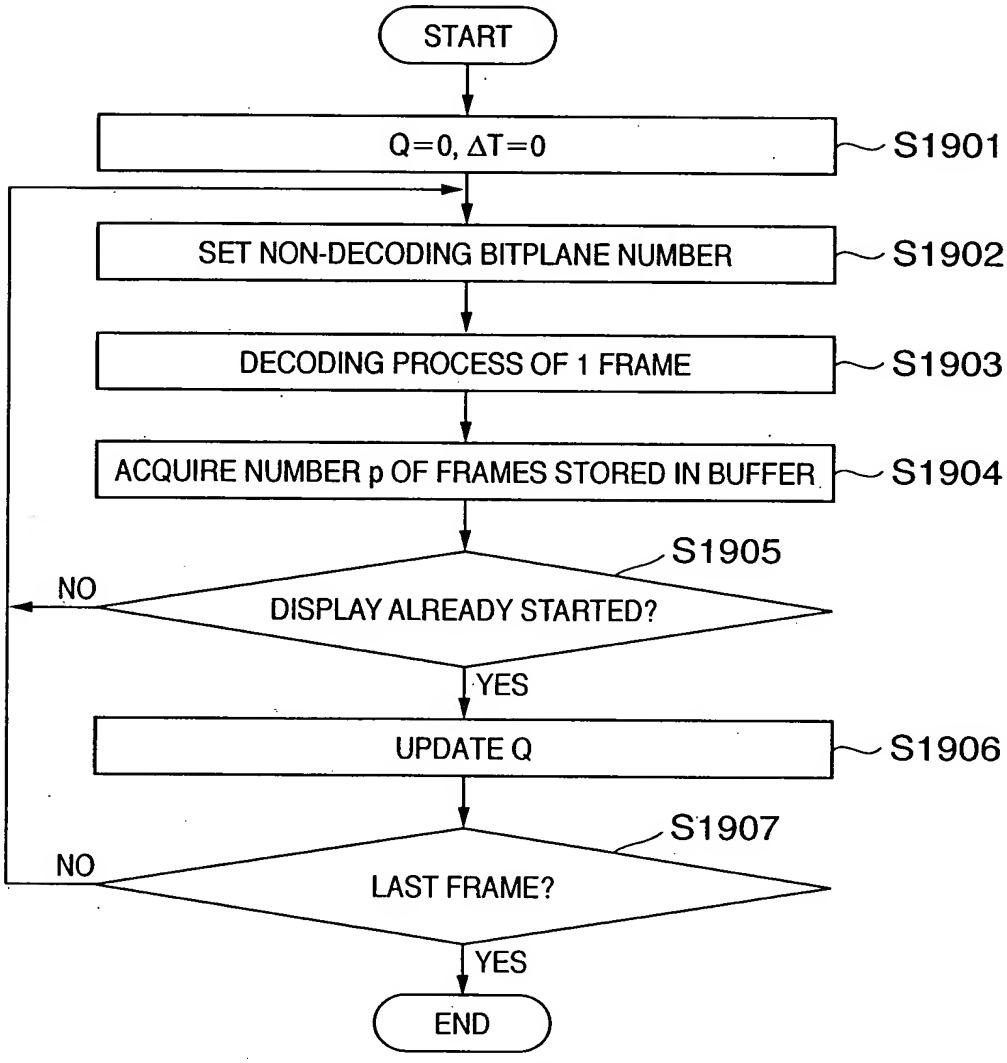

START
Q=0, ΔT=0
S1901
SET NON-DECODING BITPLANE NUMBER
S1902
DECODING PROCESS OF 1 FRAME
S1903
ACQUIRE NUMBER p OF FRAMES STORED IN BUFFER
S1904
S1905
DISPLAY ALREADY STARTED?
NO
YES
UPDATE Q
S1906
S1907
LAST FRAME?
NO
YES
END

FIG. 20

Q FACTOR Q	REQUIRED DECODING TIME D't(Q)
0	D't(0)
1	D't(1)
2	D't(2)
3	D't(3)
4	D't(4)
5	D't(5)
6	D't(6)
7	D't(7)
8	D't(8)
9	D't(9)

FIG. 21

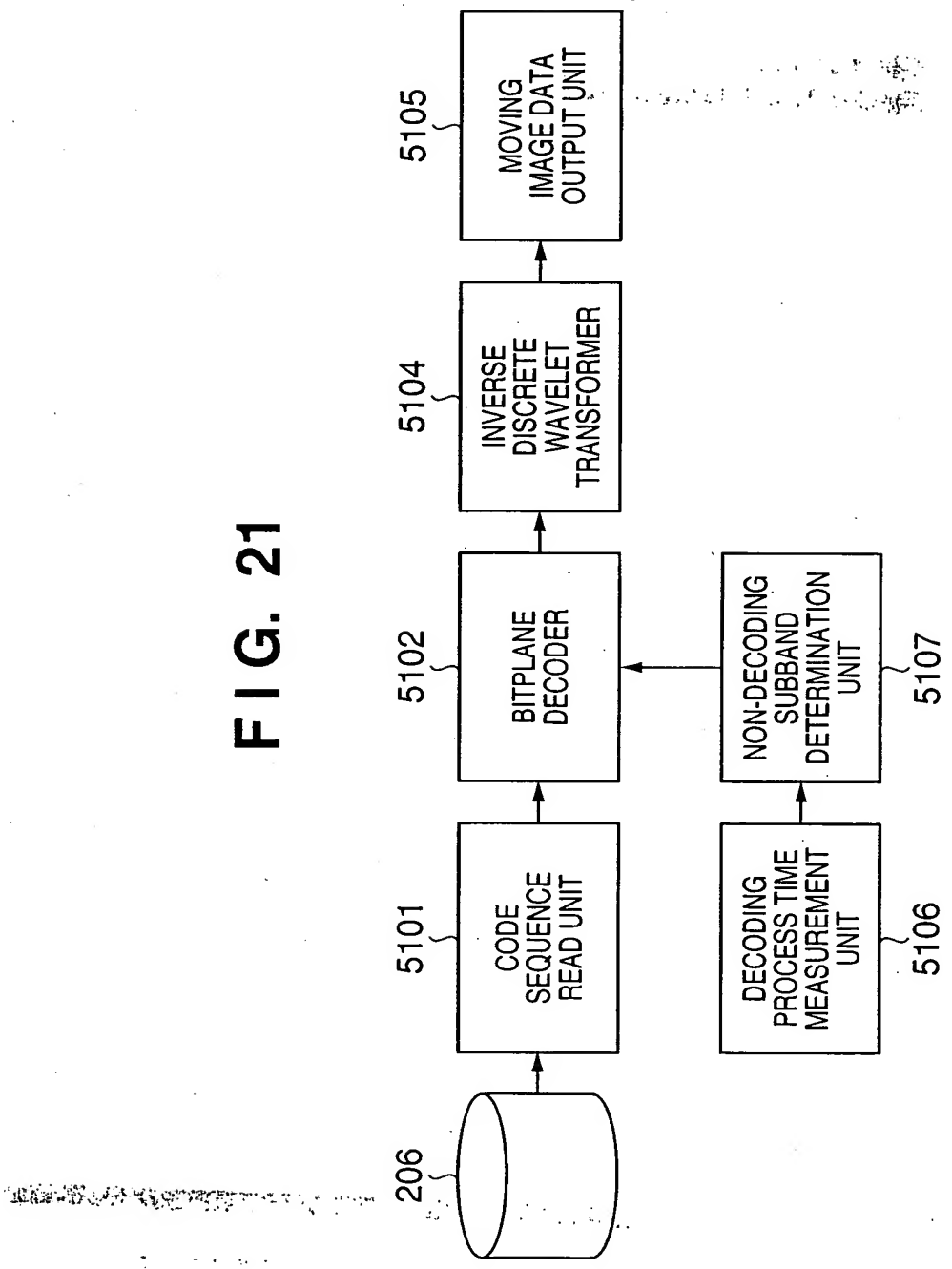

206
5101
CODE SEQUENCE READ UNIT
5102
BITPLANE DECODER
5104
INVERSE DISCRETE WAVELET TRANSFORMER
5105
MOVING IMAGE DATA OUTPUT UNIT
5106
DECODING PROCESS TIME MEASUREMENT UNIT
5107
NON-DECODING SUBBAND DETERMINATION UNIT

FIG. 22

SUBBAND INDEX SI	SUBBAND Sb	REQUIRED DECODING TIME Dt(SI)
0	HH2	Dt(0)
1	LH2	Dt(1)
2	HL2	Dt(2)
3	HH1	Dt(3)
4	LH1	Dt(4)
5	HL1	Dt(5)
6	LL	Dt(6)

FIG. 23

SUBBAND Sb	DECODING FRAME F(Sb)
HH2	0
LH2	0
HL2	0
HH1	1
LH1	1
HL1	1
LL	1

FIG. 24

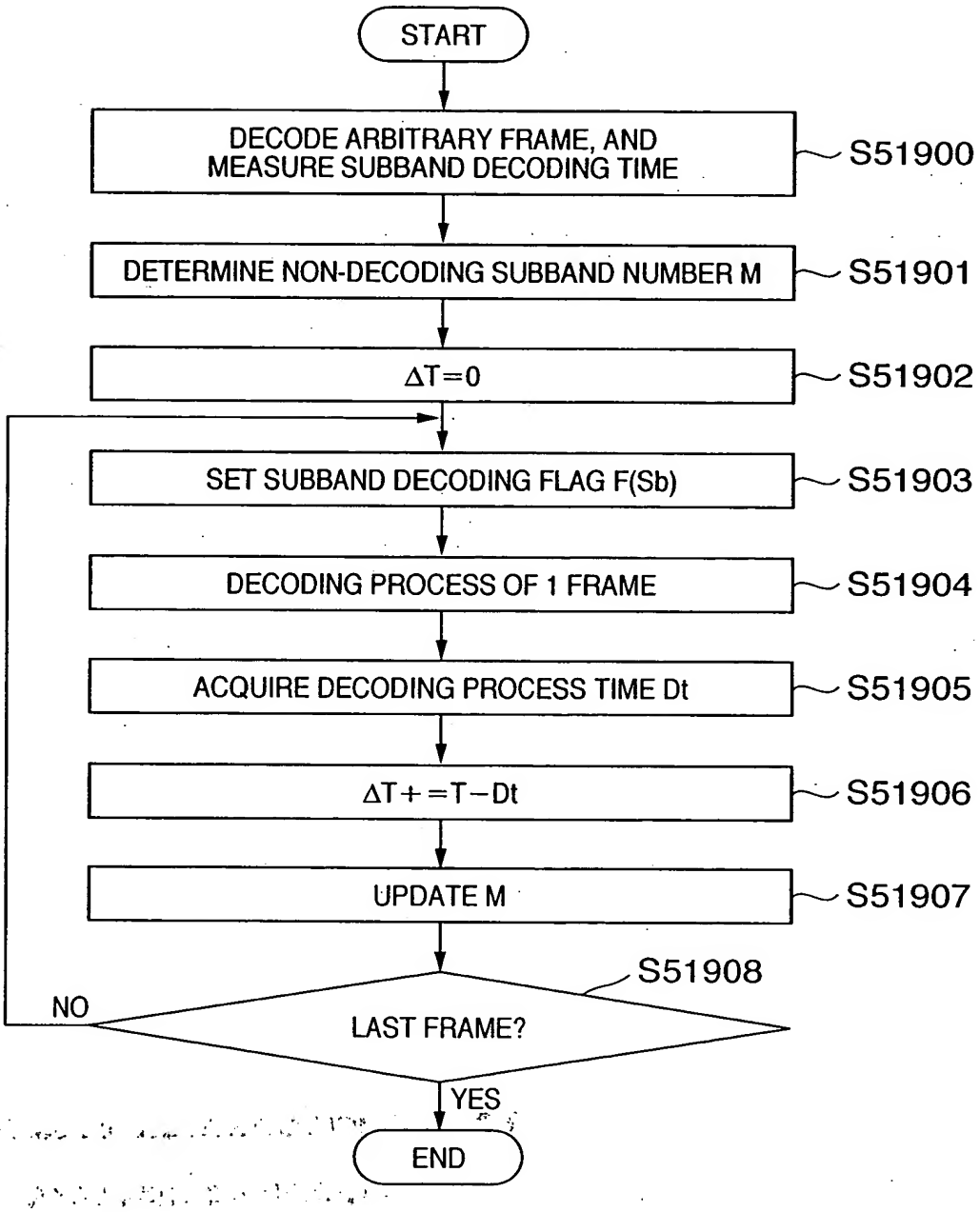

START
DECODE ARBITRARY FRAME, AND MEASURE SUBBAND DECODING TIME
S51900
DETERMINE NON-DECODING SUBBAND NUMBER M
S51901
ΔT=0
S51902
SET SUBBAND DECODING FLAG F(Sb)
S51903
DECODING PROCESS OF 1 FRAME
S51904
ACQUIRE DECODING PROCESS TIME Dt
S51905
ΔT+=T−Dt
S51906
UPDATE M
S51907
S51908
NO
LAST FRAME?
YES
END

FIG. 25

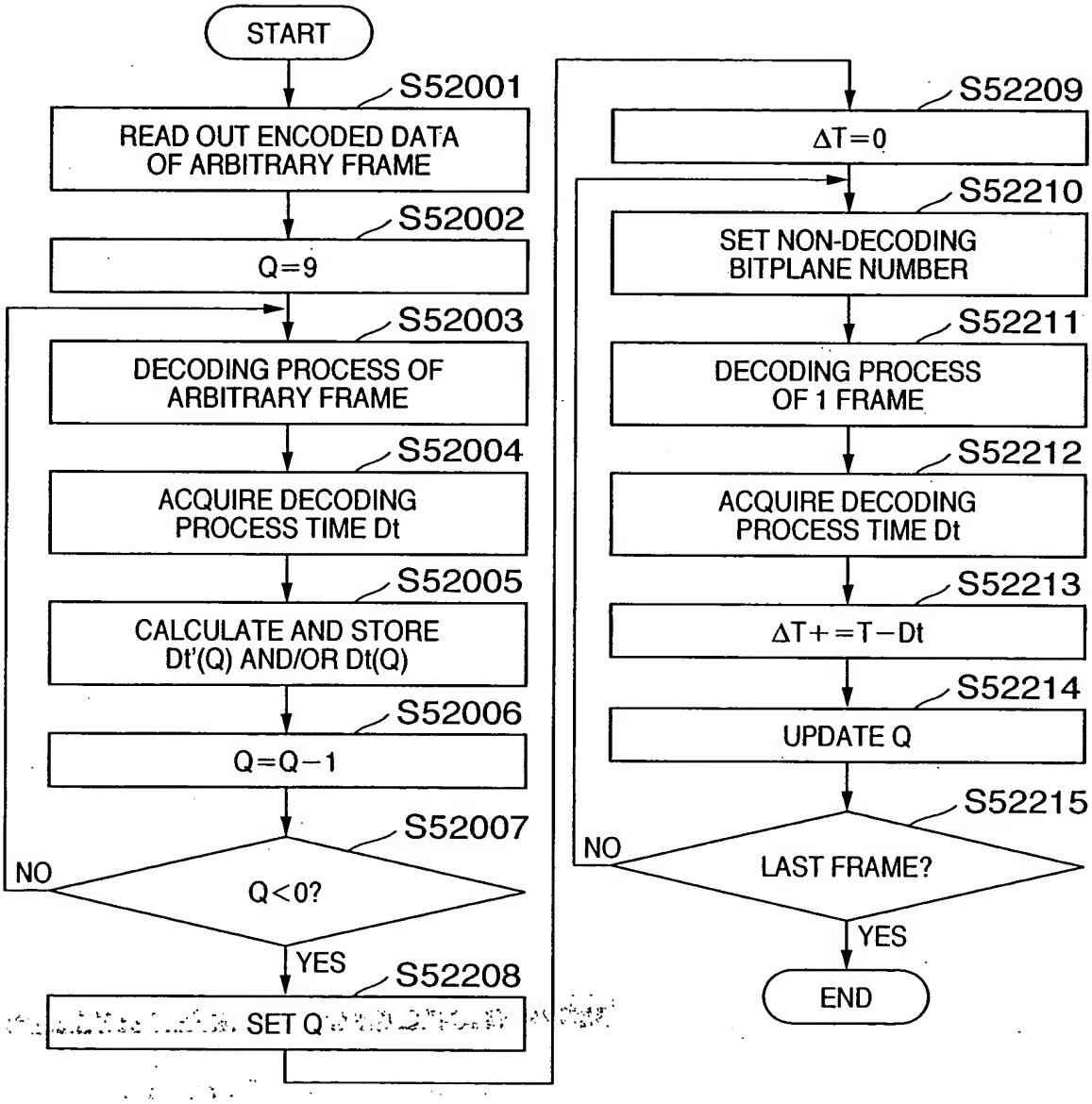
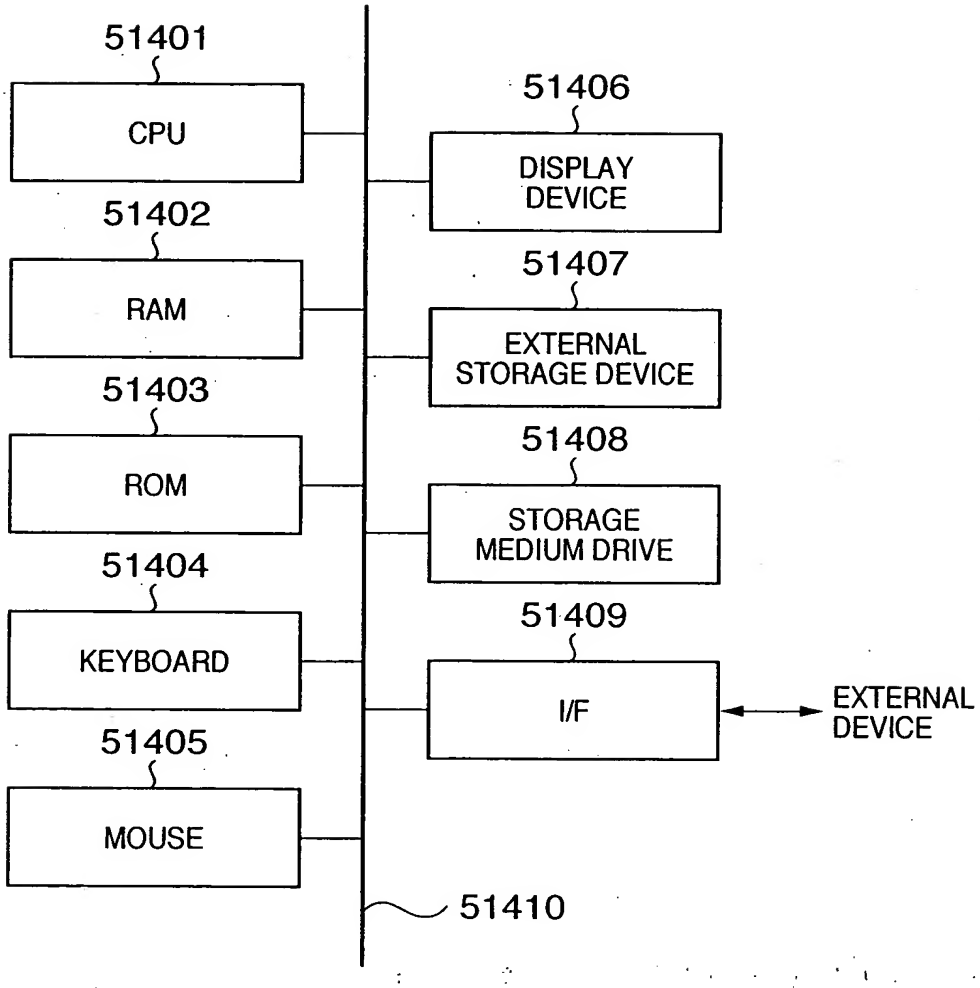

START
S52001
READ OUT ENCODED DATA OF ARBITRARY FRAME
S52002
Q=9
S52003
DECODING PROCESS OF ARBITRARY FRAME
S52004
ACQUIRE DECODING PROCESS TIME Dt
S52005
CALCULATE AND STORE Dt'(Q) AND/OR Dt(Q)
S52006
Q=Q−1
S52007
NO
Q<0?
YES
S52208
SET Q
S52209
ΔT=0
S52210
SET NON-DECODING BITPLANE NUMBER
S52211
DECODING PROCESS OF 1 FRAME
S52212
ACQUIRE DECODING PROCESS TIME Dt
S52213
ΔT+=T−Dt
S52214
UPDATE Q
S52215
NO
LAST FRAME?
YES
END

FIG. 26


51401
CPU
51402
RAM
51403
ROM
51404
KEYBOARD
51405
MOUSE
51406
DISPLAY DEVICE
51407
EXTERNAL STORAGE DEVICE
51408
STORAGE MEDIUM DRIVE
51409
I/F
EXTERNAL DEVICE
51410